

7.5.3 Operating Capacity Factor

The amount of time that the power plant operates was also varied in the sensitivity analysis. For the low case, the power plant operating capacity factor was reduced from 80% to 65% during the normal operating years. On a per unit of energy produced basis, this resulted in an average percent increase from the base case resources, emissions, and energy of +6.3%. For the high case, the operating capacity factor was increased from 80% to 85%, resulting in an average decrease of about 1.6% on a per unit of energy produced basis.

8.0 Impact Assessment

Life cycle impact assessment is an evolving technique used to characterize the possible consequences of a process. It links the results of the life cycle inventory with potential environmental and human health effects by defining relationships between activities resulting in emissions, energy use, and material consumption (stressors) with likely environmental effects (stressor categories). Examples of stressor categories are photochemical oxidants, climate change gases, and loadings that alter habitat. Two important aspects of this method of classification are that a single stressor is often associated with multiple impacts, and that not all stressors within a category result in equal amounts of damage to the environment.

The scope of impact assessment for this study involved classification of inventory data into stressor categories that are potentially linked to ecological and human health. It should be recognized that discovering and establishing a causal relationship between an emission identified in the inventory and an impact on the environment is not a component of this work or of life cycle assessment in general. The intent is not to prove or disprove that biomass power production via gasification is responsible for any degradation of the environment, but to index expected emissions, energy use, and material consumption with known consequences. This type of impact assessment is qualitative rather than quantitative, and uses the premise that less is better when examining the potential impacts of each stressor. More complete means of assessing the possible impacts of this process on the environment require fate modeling and concentration estimates. The major stressors identified in this LCA and the associated stressor categories are shown in Table 32.

Table 32: Stressor Categories Associated with Biomass Power Production

Stressor Category	Stressors	Major Impact Category H = Human health E = Ecological health Area Impacted L = Local (county) R = Regional (state) G = Global
Toxicants	Pesticides, herbicides, fertilizers Tars, diesel fuel, and other hydrocarbons SO ₂ , SO ₃ , H ₂ S, NH ₃ Fluorine and fluorides	H, E; L H, E; L H, E; L, R, G H, E; L, R
Photochemical oxidant precursors and photochemical oxidants	Hydrocarbons, non-methane hydrocarbons, VOCs Ozone (O ₃)	H, E; L, R H, E, L H, E; L, R
Particulates	Wood dust Construction, cement, road dust Microorganisms, spores, fungi	H, E; L H, E; L H, E; L, R
Air pollutants	CO, O ₃ , NO _x , SO ₂ , SO ₃ , H ₂ S, hydrocarbons, NH ₃ Chlorinated compounds wood dust, sand dust	H, E; L H; L H; L
Solid waste	Catalysts Char Gypsum Sand	H, E; L, R H, E; L, R H, E; L, R H, E; L, R
Physical trauma	Accidents Noise Odor	H; L H; L L
Climate change	CO ₂ , CH ₄ , nitrates, sulfates, changes in plant growth	E; G E, L, G
Acidification precursors	SO ₂ (H ₂ SO ₄), NO ₂ (HNO ₃), CO ₂ (HCO ₃ ⁻)	E; R, G
Nutrients	Nitrates, sulfates	H, E; L, R
Habitat effects	Monoculture, non-native species, flora kill, animal and insect kill	E; L, R
Resource depletion	Fossil fuel use Water use Mineral and ore use Groundwater pollution Topsoil erosion	E; R, G E; R E; R, G E; L, R E; L